

Remarks:

These remarks are responsive to the Office action dated March 19, 2008. Prior to entry of this response, claims 1-32 were pending in the application. By way of this response, claims 1-4, and 13 are amended, claims 11, and 20-32 are cancelled, and claims 33-54 are added. Applicant respectfully requests reconsideration of the application and allowance of the pending claims.

Allowable Subject Matter

Claims 9, 11, and 12 are indicated to be allowable if rewritten in independent form.

Applicant thanks the Examiner for the indication of allowable subject matter. Applicants have amended claim 4 to include the limitations of claim 11. Further, new claims 47 and 39 correspond to original claims 9 and 12, respectively, including the base claim. As such, claims 4-10, 12, and 39-54 should be allowed.

Formal Matters

Claims 9, 11, and 12 are objected to as being dependent upon a rejected base claim. As noted above, various claims have been amended to include the allowable subject matter.

Rejections under 35 U.S.C. § 102

Claims 1-8, 10, and 13-32 are rejected under 35 U.S.C. 102(e) as being anticipated by 6,810,841 (Peterson et al.).

Applicants believe some background information may be helpful before discussing the above issues. As noted in Applicants specification as originally filed, in some cases, electromechanical valve actuators contain mechanical springs and electrical coils that act as electromagnets, both of which are used to regulate valve position. However, during cylinder operation pressure in a cylinder may work for or against valve operation. For example, exhaust valves

overcome cylinder pressure to open, but are assisted by cylinder pressure when closing. As a result, capturing current, current necessary to overcome spring force, and holding current, current that holds a valve open or closed, varies with operating conditions of the engine.

As such, various example approaches for restarting valves is described in the application. For example, if a predetermined current does not overcome an opening or closing spring force, permitting the valve to open or close during a cycle of the cylinder, the valve may be restarted. As a further example, if the path of a valve deviates from the desired valve trajectory, one or more attempts may be made to restart the valve so that it can resume the desired trajectory.

See Applicants' specification at pages 94-95, for example.

Turning now to the claims, Applicants have amended claim 1 to claim:

A method to restart at least an electrically actuated valve including at least a spring, the valve in at least a cylinder of an internal combustion engine, the method comprising:

during a combustion cycle of said cylinder:

applying a current to the electrically actuated valve to overcome an opening or closing spring force of the valve; and

when the applied current does not overcome the opening or closing spring force to permit the valve to open or close during the cycle of the cylinder, returning said electrically actuated valve to a desired trajectory from an erroneous trajectory when an applied current to close the valve is less than a threshold; and deactivating said electrically actuated valve when an applied current to close the valve is greater than the threshold.

See, for example, FIG. 39, and the corresponding description in the application, including in particular 3910, 3912, 3916, 3918, 3930, 3920, 3922, and 3926.

In this way, the current can be adjusted to return the valve to the desired trajectory during subsequent cylinder events, until the current reaches the threshold. At that point, the valve may be deactivated to avoid operation with a degraded valve, for example.

Turning to the cited reference, Peterson, Applicants can find no mention of restarting valves. More specifically, Applicants can find no mention of returning a valve to a desired trajectory when the applied current to close the valve is less than a threshold, and deactivating the valve when the applied current to close the valve is greater than the threshold.

As such, the rejection of claim 1 should be withdrawn. Similar arguments apply to new claim 33.

With regard to claim 2, it further specifies, for example, increasing the applied current during subsequent valve operation responsive to a number of valve restarts, and decreasing the applied current during subsequent valve operation responsive to a number of on-trajectory valve events. In this way, it is possible to actively adjust the valve holding current, for example, to be large enough to maintain the desired trajectory, but not too large so as to unnecessarily waste energy. Thus, for this additional reason, the rejection of claim 2 should be withdrawn.

Applicants can find no consideration of a number of valve restarts, or a number of on-trajectory valve events, in Peterson.

With regard to claim 33, it additionally includes adjusting applied current to the valve responsive to a number of valve restarts. See, for example, 3918 of FIG. 29 of Applicants' specification. Further, it specifies deactivating the electrically actuated valve and deactivating the cylinder in which the electrically actuated valve resides when an applied current to close the valve is greater than the threshold.

With regard to Peterson, Applicants can find no mention of a number of valve restarts, as noted above. Further, Applicants can find no mention of the claimed deactivation.

As such, the rejection of claim 33 should be withdrawn.

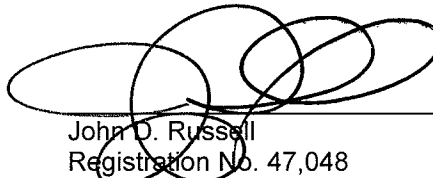
Conclusion

Applicant believes that this application is now in condition for allowance, in view of the above amendments and remarks. Accordingly, Applicant respectfully requests that the Examiner issue a Notice of Allowability covering the pending claims. If the Examiner has any questions, or if a telephone interview would in any way advance prosecution of the application, please contact the undersigned attorney of record.

Please charge any cost incurred in the filing of this Response, along with any other costs, to Deposit Account No. 06-1510.

Respectfully submitted,

ALLEMAN HALL MCCOY RUSSELL & TUTTLE LLP

A handwritten signature in black ink, consisting of several overlapping loops and a horizontal line at the end, positioned above a horizontal line.

John D. Russell
Registration No. 47,048
Customer No. 36865
Attorney/Agent for Applicant/Assignee
806 S.W. Broadway, Suite 600
Portland, Oregon 97205
Telephone: (503) 459-4141
Facsimile: (503) 459-4142